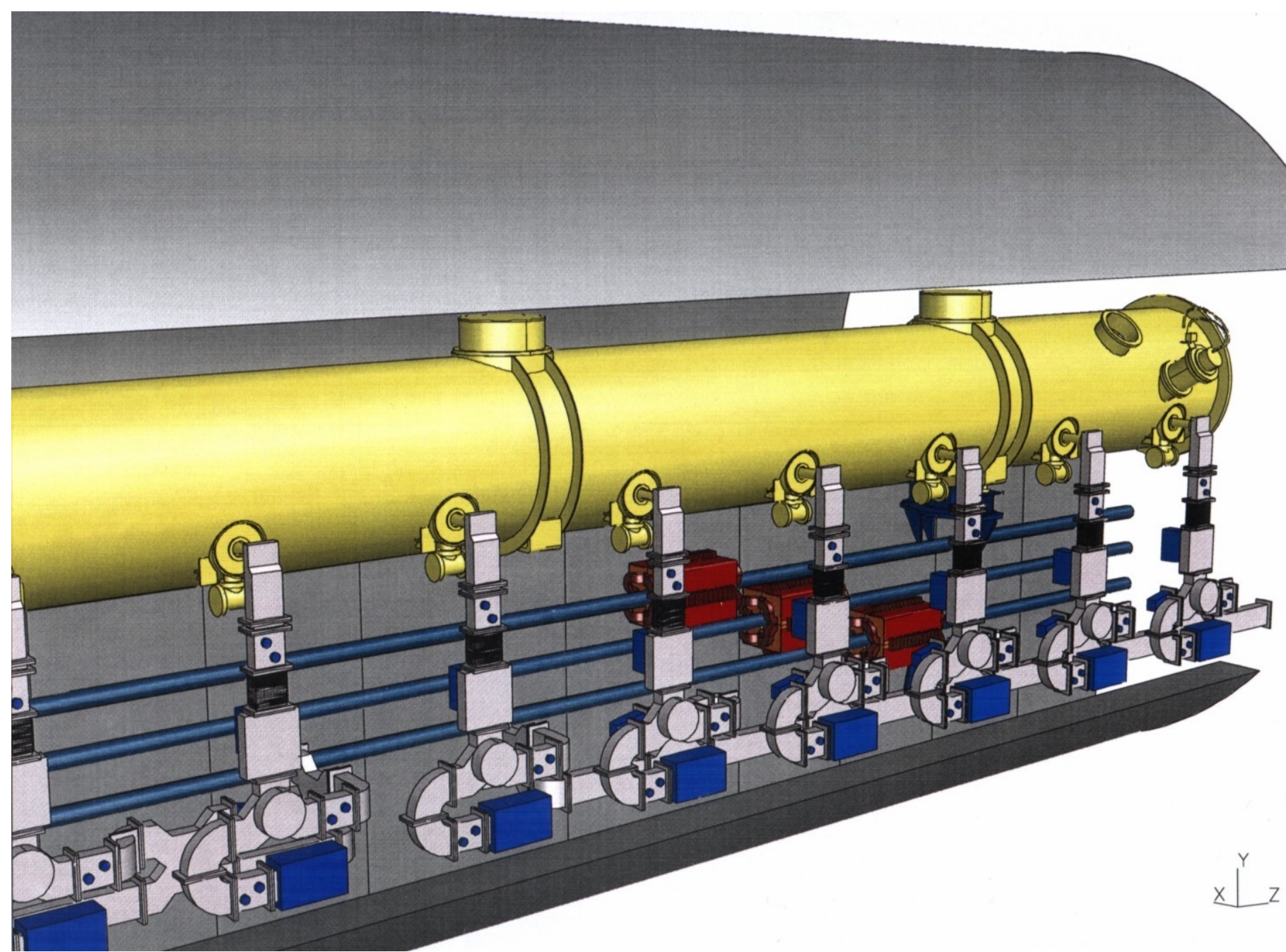
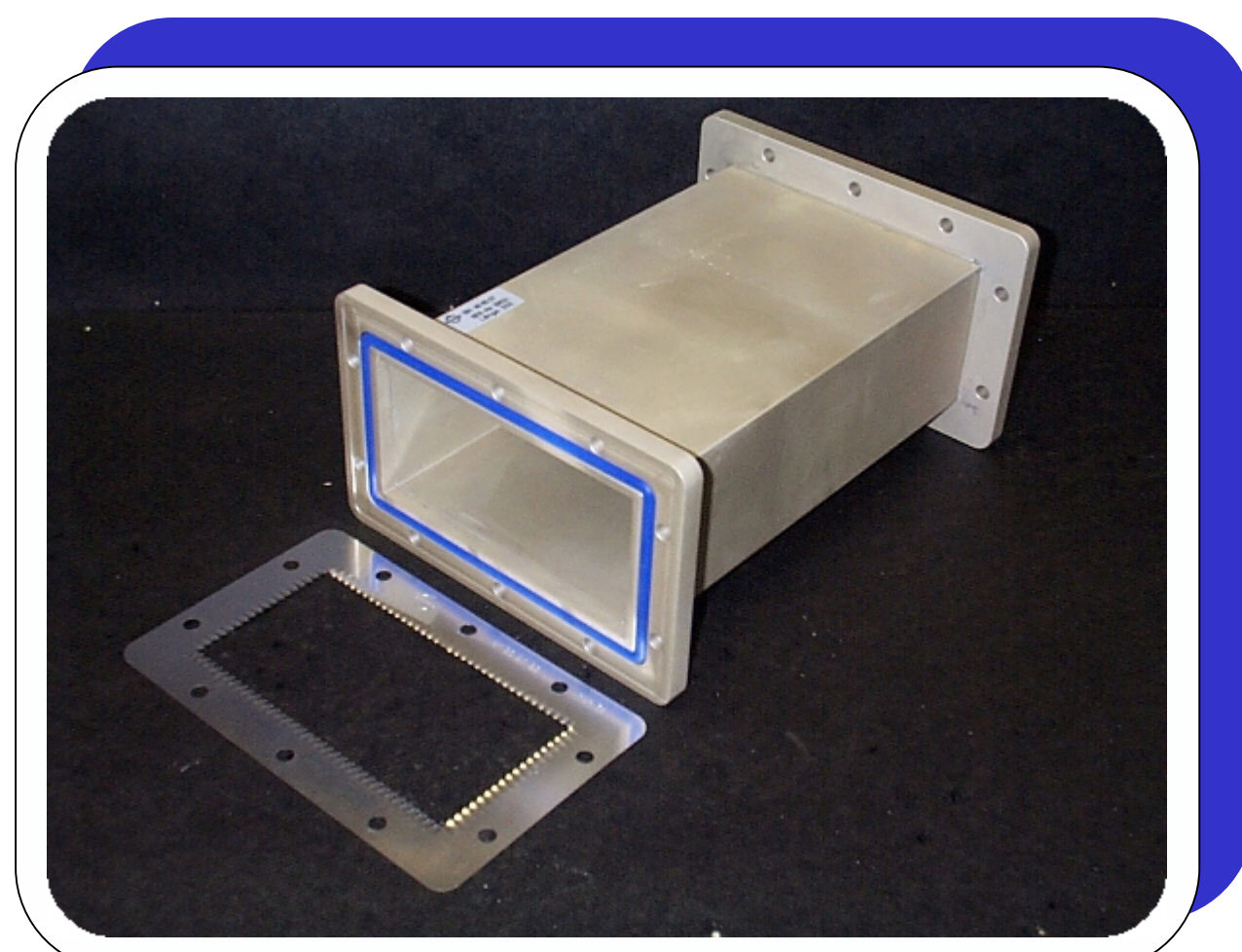
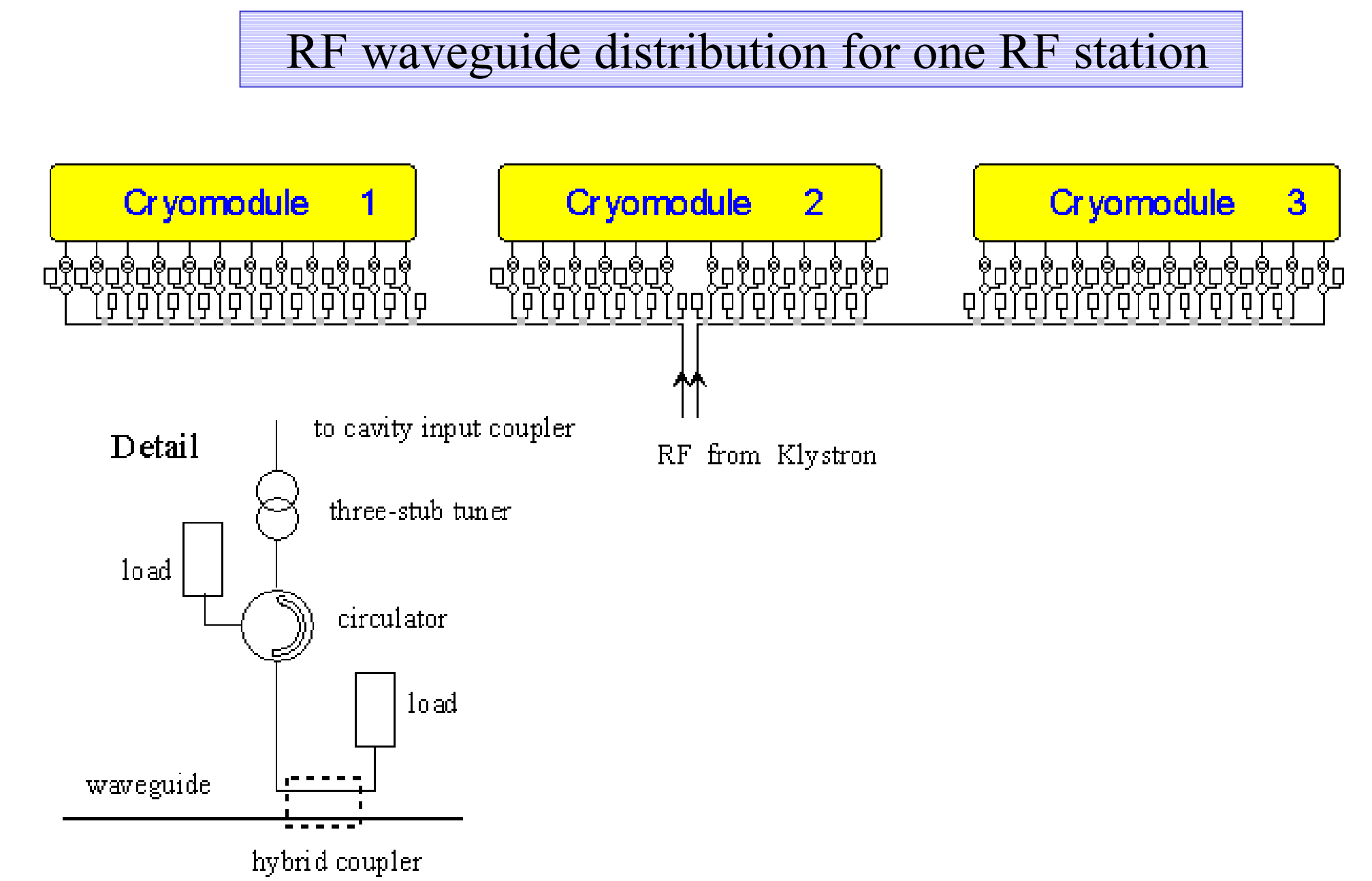


RF waveguide distribution system



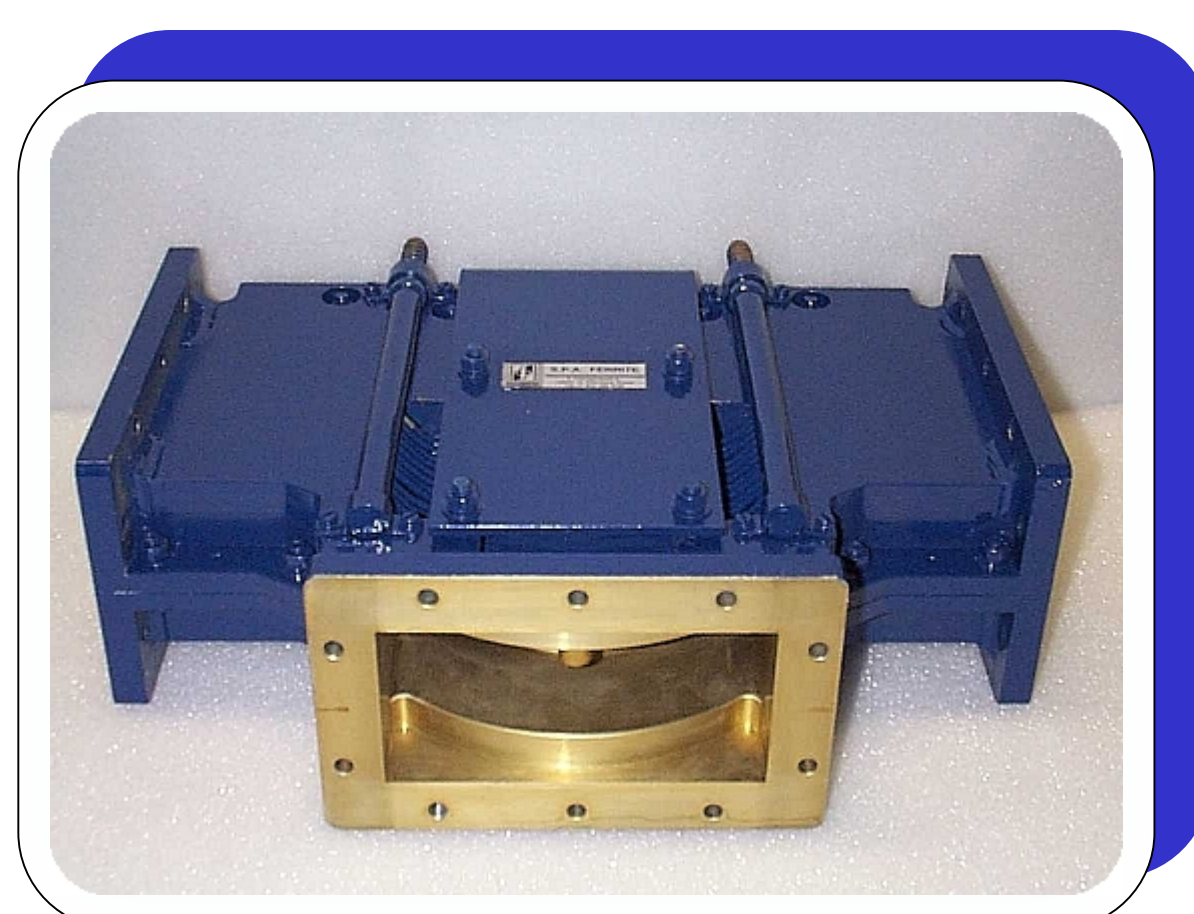
Waveguide type	WR650
Dimensions, mm	165.1 □ 82.55
Material	A1
Flange type	PDR14
Max pulse power (theoretical for 30 kV/cm)	58 MW
Max pulse power (experience)	> 5 MW
Losses at 1.3 GHz (experience)	0.22%/m
Max waveguide losses (for 57 kW _{ave} 10 Hz)	125 W/m
Waveguide temperature (for 57 kW _{ave})	40 □ C+T _{ambient}
Max thermal waveguide expansion	0.9 mm/m
Max phase-shift (over waveguide branch due to increasing waveguide width)	12 □
Total RF power _{ave} for TESLA	36 MW
Total waveguide losses _{ave}	1.4 MW
Total circulator losses _{ave}	0.7 MW
Total length of waveguide system	85 km
Total length of circulator structure	10 km



Straight waveguide

SPINNER Germany

Length, mm 100 □ 3000



Circulator

S.P.A. FERRITE Ltd. Russia

Type	WFHI 3-4
Peak input power, MW	0.4
Average power, kW	8
Min isolation at 1.3 GHz, dB	□ 30
Max insertion loss at 1.3 GHz, dB	□ 0.08
Input SWR at 1.3 GHz (for full reflection)	1.1



Directional coupler

DESY & SPINNER

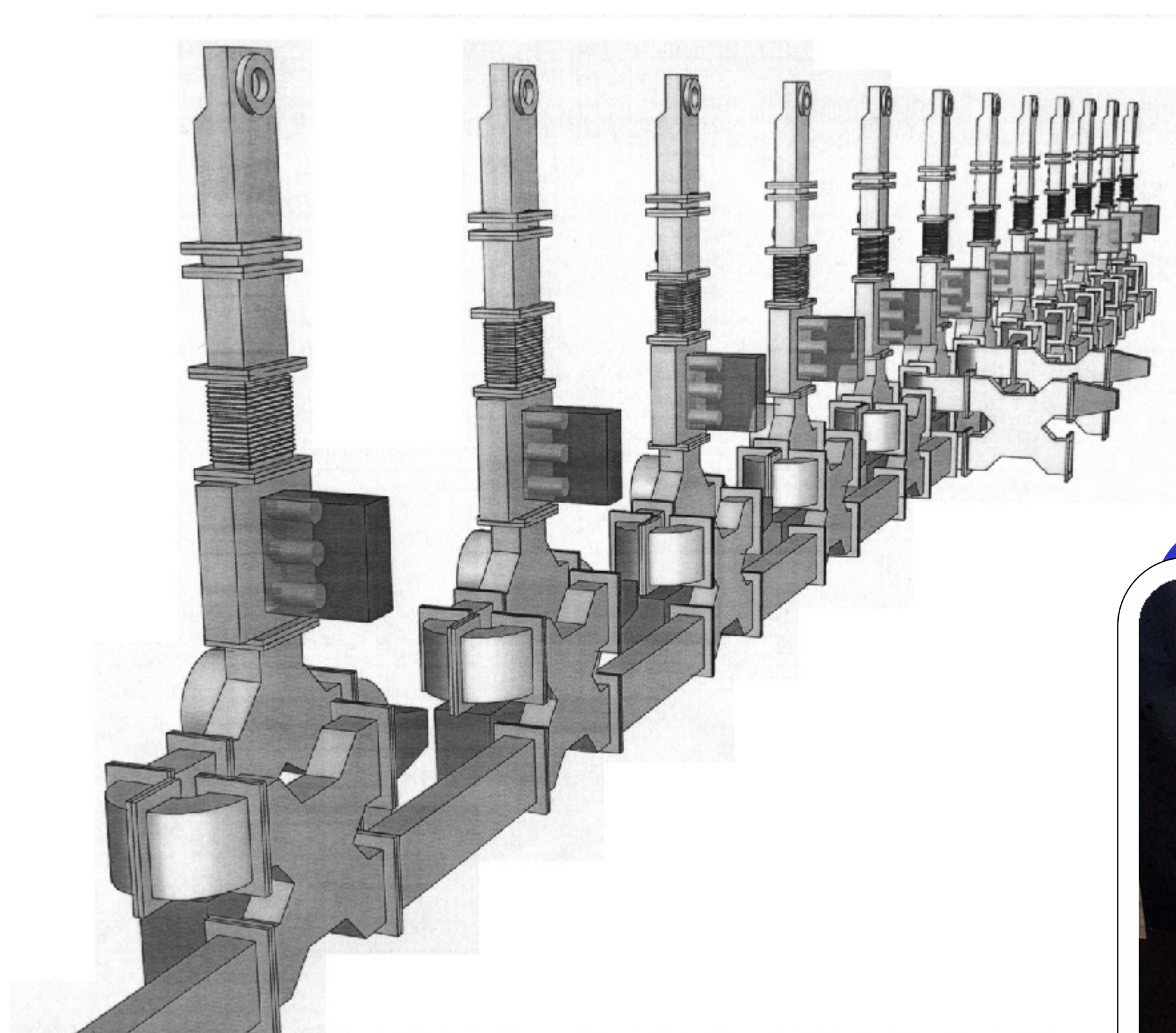
Peak input power, MW	5
Coupling factor, dB	60
Directivity at 1.3GHz, dB	□ 40



Bellow

SPINNER Germany

3-D view of waveguide system for cryomodule



Power phasemitter

DESY & IBFM

Peak input power, MW	5
Phase range, degree	100
SWR	□ 1.17
Physical length, mm	400



E- & H-bend

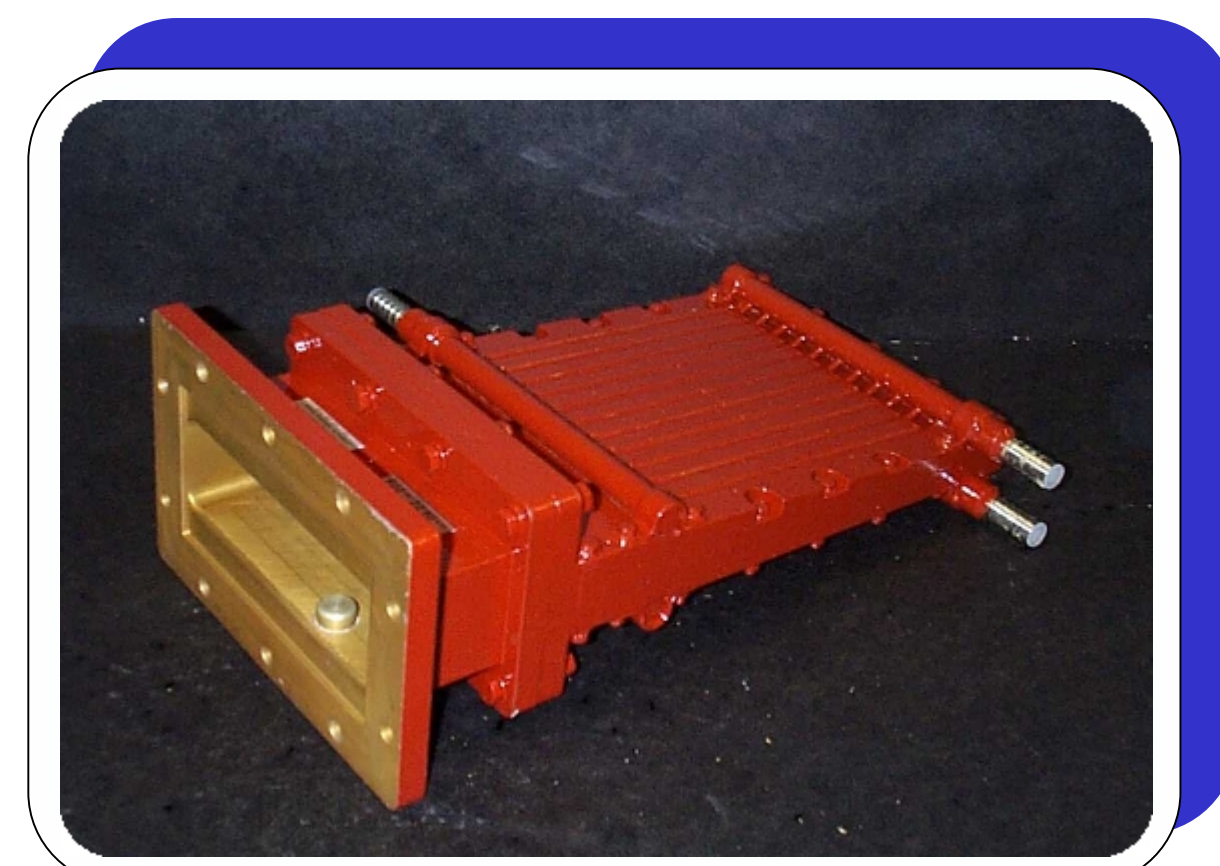
SPINNER Germany



Hybrid coupler

RFT, SPINNER

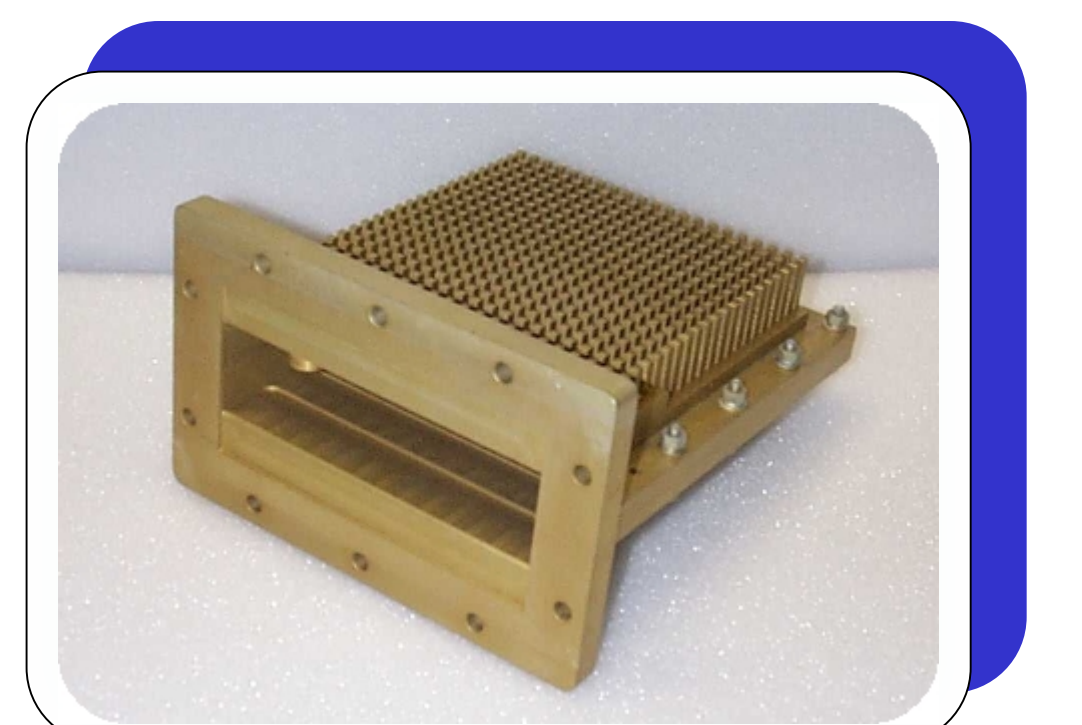
Directivity, dB	□ 30
Return loss, dB	□ 35
Coupling factor, dB	12.5; 12.0; 11.4; 10.7; 10.1; 9.6; 9.1; 8.5; 7.8; 7.0; 6.0; 4.8; 3.0
Accuracy of coupling factor, dB	□ 0.2



Dummy load

S.P.A. FERRITE Ltd. Russia

Type	WFHL 3-1	WFHL 3-5
Peak input power, MW	2.0	5.0
Average power, kW	10	100
Min return loss at 1.3 GHz, dB	32 □ 40	32 □ 40
Max VSWR at 1.3 GHz	□ 1.05	□ 1.05
Max surface temperature, □ T □ C (for full average power)	20	30
Physical length, mm	385	850



Air-cooled dummy load

S.P.A. FERRITE Ltd. Russia

Type	WFHL 3-1
Peak input power, MW	1.0
Average power, kW	0.2
Min return loss at 1.3GHz, dB	32 □ 40
Max VSWR at 1.3 GHz	□ 1.05
Max surface temperature, □ T □ C (for full average power)	50
Physical length, mm	230



Three-stub tuner

China

Changing phase, degree	□ 60
Impedance matching range	1/3Z _w □ 3Z _w
Max power, MW	2

* Z_w — waveguide impedance